

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/687,189
Applicant(s) : Nagarajan Subramaniyan
Filed: 10/16/2003
TC/A.U. : 2141
Confirmation No. : 7571
Examiner : SERRAO, RANODHIN
Title : METHODS AND APPARATUS FOR
OFFLOADING TCP/IP PROCESSING USING A
PROTOCOL DRIVER INTERFACE FILTER

REPLY BRIEF

MS APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir or Madam:

This reply brief is presented under 37 CFR § 41.41(a) and 41.43(b) in response to Examiner's Answer of 11/02/2007 regarding the above-identified application.

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Adaptec, Inc., a corporation established under the laws of the State of Delaware and having a principle place of business in Milpitas, California.

II. RELATED APPEALS AND INTERFERANCES

Applicants are unaware of any related appeal or interference.

III. STATUS OF CLAIMS

A. Total Claims: 1-24.

B. Current Status of Claims:

1. Claim canceled: none
2. Claims withdrawn: none
3. Claims pending: 1-24
4. Claims allowed: none
5. Claims rejected: 1-24

C. Claims on Appeal: 1-24

IV. STATUS OF AMENDMENTS

An Amendment with all compliances ("Amendment A") in response to a Non-Final Office Action was submitted on 02/05/2007. A Final Office Action was mailed on 03/27/2007. A Notice of Appeal was submitted on 05/23/2007 giving notice to appeal the rejections in the Final Office Action. An Appeal Brief was filed on 07/23/2007. The Examiner mailed an Examiner's Answer on 11/02/2007. This Reply Brief is filed in response to the Examiner's Answer. The claims on appeals are those in the Amendment A.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A. Independent claim 1

Independent claim 1 is a method for establishing a connection between a first device and a second device, said first device comprising a first protocol driver,

a first application, a first socket layer disposed between said first protocol driver and said first application, and a first NIC driver, said second device comprising a second NIC driver (Paras. [0043], [0054], and [0057]; Figs. 3 and 4A-B), said method comprising: providing a first filter between said first socket layer and said first protocol driver, said first filter being external to said first NIC driver and first NIC hardware that is driven by said first NIC driver (Para. [0043]; Figs. 3 and 4A-B); providing a first offload hardware in said first device (Paras. [0043]-[0044]; Figs. 3); providing a second filter in said second device (Para. [0043]; Figs. 3 and 4A-B); receiving, using said first filter, a request from said first application through said first socket layer (Para. [0047]; Figs. 3 and 4A-C); examining, using said first filter, a transport handle in said request to determine whether said connection is an offload connection (Paras. [0046] and [0065]; Fig. 4C); processing said request to produce a packet set, said processing being performed by said first offload hardware if said connection is an offload connection, said processing being performed by said first protocol driver if said connection is not said offload connection, said packet set including one or more ordered packets (Para. [0047] and [0065]; Figs. 4C-D); sending, using said first NIC driver and said first NIC hardware, said packet set to said second device (Para. [0047]); determining, using said second NIC driver, whether said packet set contains an offload transport handle (Para. [0067]; Fig. 4D); and passing said packet set to said second filter if said packet set contains said offload transport handle (Para. [0068]; Fig. 4D).

Claims 2-12, which are argued together with independent claim 1, depend directly or indirectly from independent claim 1 and incorporate all of the elements of independent claim 1, as described above.

B. Independent claim 13

Independent claim 13 is an apparatus comprising: an application (Paras. [0043], [0054], and [0057]; Figs. 3 and 4A-B); a socket layer (Paras. [0043], [0054], and [0057]; Figs. 3 and 4A-B); a filter configured to receive a request from said application through said socket layer and to examine a transport handle in said request for determining whether a connection pertaining to said request is an offload

connection (Paras. [0043], [0046], [0054], [0057], and [0065]; Figs. 3 and 4A-C); a protocol driver configured to process said request into a packet set if said connection is not said offload connection, said packet set including one or more ordered packets (Para. [0047] and [0065]; Figs. 4C-D); an offload hardware configured to process said request into said packet set if said connection is said offload connection (Paras. [0043]-[0044], [0047], and [0065]; Figs. 3 and 4C-D); a NIC driver configured to transmit said packet set (Paras. [0043]-[0047]; Figs. 3); and NIC hardware driven by said NIC driver (Paras. [0043]-[0047]; Figs. 3), wherein said filter is disposed between said socket layer and said protocol driver and external to said NIC driver and said NIC hardware (Paras. [0043]-[0044]; Figs. 3 and 4A-B).

Claims 14-24, which are argued together with independent claim 13, depend directly or indirectly from independent claim 13 and incorporate all of the elements of independent claim 13, as described above.

C. Dependent claims

Claim 2 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein said second filter is provided between a second socket layer and a second protocol driver in said second device (Paras. [0043]-[0044]; Figs. 3 and 4A-B).

Claim 3 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein said first offload hardware is implemented in said first NIC hardware (Para. [0044]).

Claim 4 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein said processing is performed by said first protocol driver if said connection is an IPsec connection (Para. [0044]).

Claim 5 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein said transport handle pertains to at least one of hardware capabilities of said first device and a routing table (Para. [0046]).

Claim 6 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein at least one of said first protocol driver and said second protocol is configured for processing a transport protocol (Para. [0044]).

Claim 7 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein at least one of said first protocol driver and said second protocol is configured for processing TCP (Para. [0044]).

Claim 8 is a dependent claim to independent claim 1 and recites the method of claim 1, at least one of said first protocol driver and said second protocol is configured for processing IP (Para. [0044]).

Claim 9 is a dependent claim to independent claim 1 and recites the method of claim 1 further comprising providing a second offload hardware in said second device, said second offload hardware configured for re-assembling said packet set into a data stream (Para. [0047]).

Claim 10 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein said determining includes detecting at least one of a connection establishment handshake and a handshake termination between said first device and said second device (Para. [0046]).

Claim 11 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein said determining includes using said second filter (Paras. [0057]-[0058]).

Claim 12 is a dependent claim to independent claim 1 and recites the method of claim 1, wherein said first protocol driver is supplied with an operating system of said first device and without being modified (Paras. [0044] and [0052]).

Claim 14 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said filter is included in an operating system of said apparatus (Paras. [0044] and [0052]).

Claim 15 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said offload hardware is implemented in said NIC hardware (Para. [0044]).

Claim 16 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said protocol driver is configured to process said request if said connection is an IPsec connection (Para. [0044]).

Claim 17 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said transport handle pertains to at least one of hardware capabilities of said apparatus and a routing table (Para. [0046]).

Claim 18 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said offload hardware is configured to process a transport protocol (Para. [0044]).

Claim 19 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said offload hardware is configured to process TCP (Para. [0044]).

Claim 20 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said offload hardware is configured to process IP (Para. [0044]).

Claim 21 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said offload hardware is further configured to re-assemble an incoming packet set into a data stream, said incoming packet set including one or more packets (Para. [0047]).

Claim 22 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said NIC driver is further configured to determine whether an incoming packet set contains an offload transport handle and to, if said incoming packet set contains said offload transport handle, pass said incoming packet set to said filter (Para. [0046]).

Claim 23 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said filter is further configured to determine whether an incoming packet set contains an offload transport handle (Para. [0046]).

Claim 24 is a dependent claim to independent claim 13 and recites the apparatus of claim 13, wherein said protocol driver is included in an operating system of said apparatus without being modified (Paras. [0044] and [0052]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether or not claims 1-24 are unpatentable under 35 U.S.C. 103(a) over Boucher et al. (US Patent No. 6,247,060), hereinafter "Boucher", in view of Anand et al. (US Patent Application No. 2002/0062333), herein after "Anand".

VII. ARGUMENT

Rejections under USC § 103

On page 4 of the Examiner's Answer, the Examiner argues that claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boucher and Anand.

A rejection under 35 USC § 103(a) requires that the combined references suggest the claimed combination. (MPEP 706 and 2141 et seq.). Under the Graham test, three factors must be evaluated: the scope and content of the prior art; the differences between the prior art and the claimed invention; and the level of ordinary skill in the art. (MPEP 706 and 2141 et seq.).

Independent Claims 1 and 13

On pages 4-6 and 8-9 of the Examiner's Answer, the Examiner argues that the combination of Boucher and Anand teach the limitations of independent claims 1 and 13 of this application and argues that the combination would have been obvious to one having ordinary skill in the art at the time of the invention.

On pages 10-11 of the Examiner's Answer, the Examiner provides Examiner's arguments (I), (II), and (III) in response to the Applicant's arguments. In response, Applicant's remarks are provided below:

Examiner's argument (I):

The Examiner argues that, as pointed out by Applicant, Boucher teaches a filter driver at the top of the TCP/IP protocol stack (col. 32, lines 25-33) and argues that, since the filter intercepts route socket information from the socket layer destined for the TCP driver (col. 44, line 64-col. 45, line 10), it is obvious that the filter is provided between a socket layer and a protocol layer.

Applicant's remark regarding Examiner's argument (I):

Applicant respectfully agrees that, as argued by the Examiner, Boucher may be construed to teach a filter between a socket layer and a protocol driver.

Examiner's argument (II):

The Examiner argues that Boucher teaches using a filter (col. 53, lines 35-54) and Anand teaches examining a transport handle in a request using a process in the NIC 100 (Para. 56-58). The Examiner indicates that in Para. 56 Anand states, "This data field can simply be in the form of a control flag or flags, which merely indicates that a particular function be performed (such as a checksum), or the information can be in the form of a pointer to a data structure that further defines how a task should be carried out." Accordingly, the Examiner argues that Boucher and Anand teach the claimed limitations.

Applicant's remark regarding Examiner's argument (II):

Applicant respectfully disagrees and wishes to point out that the combination of Boucher and Anand does not teach the limitations of "determining, using said second NIC driver, whether said packet set contains an offload transport handle" and "passing said packet set to said second filter if said packet set contains said offload transport handle" as required in claim 1. Applicant also wishes to point out that the combination of Boucher and Anand does not teach the limitation of "a filter configured to examine a transport handle in said request for determining whether a connection pertaining to said request is an offload connection" as required in claim 13.

In Para. 56, Anand teaches, "FIG. 4 further illustrates the additional data structure field that is appended to the NDIS data packet to identify task offloads—the packet extension 150. As discussed, it is this packet extension 150 which defines a data structure containing information necessary for the identification of the particular task, or tasks, that are being offloaded to the destination NIC. In the preferred embodiment, for each task offload type (e.g., checksum, encryption/decryption, etc) a predefined data field will be included within the packet

extension 150." In Para 57, Anand further teaches, as indicated by the Examiner, "The NIC 100 may be configured to recognize the task offload control field in the packet extension 150 as applying only to the attached packet."

As can be appreciated from at least Anand's statements quoted above, Anand teaches that the packet extension 150 is known, *a priori*, to be appended to the NDIS data packet before the offload destination NIC 100 receives the NDIS data packet. Therefore, the offload destination NIC 100 recognizes the task offload control field in the packet extension 150, but does not determine whether the NDIS data packet contains the packet extension 150.

Further, as taught by Anand in Para. 56, the packet extension 150 defines a particular task or tasks (e.g., checksum, encryption/decryption, etc) being offloaded to the offload destination NIC 100. The fact that the packet extension 150 is appended to the NDIS data packet does not trigger the NDIS data packet to be passed to a second filter in a second device.

For the above reasons and others, it is respectfully submitted that Boucher and Anand, either alone or in combination, do not teach all the claimed limitations in either of claims 1 and 13.

Examiner's argument (III):

The Examiner indicates that in Para. 53 Anand states, "The driver 116 then controls/manipulates the hardware on the NIC so that it will perform whatever functional tasks have been requested via the contents of the packet extension." Accordingly, the Examiner argues that it is evident then that requests are contained in packets and argues that the NIC hardware may process the request. The Examiner further argues that in Para. 75-78 Anand discloses an offload buffer which is a region of memory used to temporarily hold ordered packets while it is being moved from one place to another as is well known to one of ordinary skill in the art.

Applicant's remark regarding Examiner's argument (III):

Applicant respectfully disagrees and wishes to point out that the combination of Boucher and Anand does not teach the limitation that "processing said request to

produce a packet set, said processing being performed by said first offload hardware if said connection is an offload connection, said processing being performed by said first protocol driver if said connection is not said offload connection" as required in each of claims 1 and 13. Applicant also wishes to point out that the combination of Boucher and Anand does not teach the limitation of "said packet set including one or more ordered packets" as required in each of claims 1 and 13.

In Para. 53-58, Anand teaches that NIC 100 may perform one or more tasks (e.g., checksum, encryption/decryption, etc) defined in the packet extension 150. However, Anand does not teach that the one or more tasks produce a packet set such that whether the packet set contains an offload transport handle is determined by NIC 100. In other words, even if Anand is construed to teach that NIC 100 is a first offload hardware that processes a request to produce a packet set, Anand does not teach an NIC driver used in determining whether the packet set contains an offload transport handle as required in claim 1. Further, Anand does not teach the limitation that the processing of the request is performed by a first protocol driver if a connection is not an offload connection as required in each of claims 1 and 13.

In addition, the offload buffer taught by Anand cannot be construed to teach the limitation that the packet set, which is produced as a result of request processing performed by the first offload hardware or the first protocol driver, contains one or more ordered packets as required in each of claims 1 and 13.

Based Applicant's remarks provided above and other reasons, it is respectfully submitted that each of claims 1 and 13 is novel, nonobvious, and patentable over the cited art of record, taken alone or in combination.

Dependent Claims 2-12 and 14-24

The dependent claims 2-12 and 14-24 are patentable not only due to their dependency on at least one of patentable parent claims 1 and 13 but also may due to their recitations of independently patentable features.

For the aforementioned reasons and others, it is respectfully submitted that the pending claims are novel, non-obvious, and patentable over the cited art of record, taken alone or in combination. It is respectfully requested that the rejections of the pending claims be withdrawn.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner and/or members of the Board are invited to telephone Applicant's attorney Joseph A. Nguyen at (408) 213-9540 to facilitate this appeal.

At any time during the pendency of this application, please charge any additional fees or credit overpayment to the Deposit Account No. 502284.

Respectfully Submitted,
Nagarajan Subramaniyan

By their Representatives:

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1/2/2008

Date:

VIII. CLAIMS APPENDIX

1. (Previously presented) A method for establishing a connection between a first device and a second device, said first device comprising a first protocol driver, a first application, a first socket layer disposed between said first protocol driver and said first application, and a first NIC driver, said second device comprising a second NIC driver, said method comprising:

providing a first filter between said first socket layer and said first protocol driver, said first filter being external to said first NIC driver and first NIC hardware that is driven by said first NIC driver;

providing a first offload hardware in said first device;

providing a second filter in said second device;

receiving, using said first filter, a request from said first application through said first socket layer;

examining, using said first filter, a transport handle in said request to determine whether said connection is an offload connection;

processing said request to produce a packet set, said processing being performed by said first offload hardware if said connection is an offload connection, said processing being performed by said first protocol driver if said connection is not said offload connection, said packet set including one or more ordered packets;

sending, using said first NIC driver and said first NIC hardware, said packet set to said second device;

determining, using said second NIC driver, whether said packet set contains an offload transport handle; and

passing said packet set to said second filter if said packet set contains said offload transport handle.

2. (Previously presented) The method of claim 1, wherein said second filter is provided between a second socket layer and a second protocol driver in said second device.
3. (Previously presented) The method of claim 1, wherein said first offload hardware is implemented in said first NIC hardware.
4. (Previously presented) The method of claim 1, wherein said processing is performed by said first protocol driver if said connection is an IPsec connection.
5. (Previously presented) The method of claim 1, wherein said transport handle pertains to at least one of hardware capabilities of said first device and a routing table.
6. (Previously presented) The method of claim 1, wherein at least one of said first protocol driver and said second protocol is configured for processing a transport protocol.
7. (Previously presented) The method of claim 1, wherein at least one of said first protocol driver and said second protocol is configured for processing TCP.
8. (Previously presented) The method of claim 1, at least one of said first protocol driver and said second protocol is configured for processing IP.
9. (Previously presented) The method of claim 1 further comprising providing a second offload hardware in said second device, said second offload hardware configured for re-assembling said packet set into a data stream.
10. (Previously presented) The method of claim 1, wherein said determining includes detecting at least one of a connection establishment handshake and a handshake termination between said first device and said second device.

11. (Previously presented) The method of claim 1, wherein said determining includes using said second filter.

12. (Previously presented) The method of claim 1, wherein said first protocol driver is supplied with an operating system of said first device and without being modified.

13. (Previously presented) An apparatus comprising:
an application;
a socket layer;
a filter configured to receive a request from said application through said socket layer and to examine a transport handle in said request for determining whether a connection pertaining to said request is an offload connection;
a protocol driver configured to process said request into a packet set if said connection is not said offload connection, said packet set including one or more ordered packets;
an offload hardware configured to process said request into said packet set if said connection is said offload connection;
a NIC driver configured to transmit said packet set; and
NIC hardware driven by said NIC driver,
wherein said filter is disposed between said socket layer and said protocol driver and external to said NIC driver and said NIC hardware.

14. (Previously presented) The apparatus of claim 13, wherein said filter is included in an operating system of said apparatus.

15. (Previously presented) The apparatus of claim 13, wherein said offload hardware is implemented in said NIC hardware.

16. (Previously presented) The apparatus of claim 13, wherein said protocol driver is configured to process said request if said connection is an IPsec connection.

17. (Previously presented) The apparatus of claim 13, wherein said transport handle pertains to at least one of hardware capabilities of said apparatus and a routing table.

18. (Previously presented) The apparatus of claim 13, wherein said offload hardware is configured to process a transport protocol.

19. (Previously presented) The apparatus of claim 13, wherein said offload hardware is configured to process TCP.

20. (Previously presented) The apparatus of claim 7-13, wherein said offload hardware is configured to process IP.

21. (Previously presented) The apparatus of claim 13, wherein said offload hardware is further configured to re-assemble an incoming packet set into a data stream, said incoming packet set including one or more packets.

22. (Previously presented) The apparatus of claim 13, wherein said NIC driver is further configured to determine whether an incoming packet set contains an offload transport handle and to, if said incoming packet set contains said offload transport handle, pass said incoming packet set to said filter.

23. (Previously presented) The apparatus of claim 13, wherein said filter is further configured to determine whether an incoming packet set contains an offload transport handle.

24. (Previously presented) The apparatus of claim 13, wherein said protocol driver is included in an operating system of said apparatus without being modified.

IX. EVIDENCE APPENDIX

None

X. RELATED PROCEEDINGS APPENDIX

None